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TRIAD

January 21, 1980

Deborah T. Marsh
Union Carbide Corporation
P. O. Box 8361
So. Charleston, WV 25303

Subject: WELLPOINT INSTALLATION
Sistersville Sites 1 & 2
Sistersville, Tyler County, WV
Project Nos. C79099 & C79100

Dear Deborah:

The purpose of this letter is to summarize our work in the installation of sampling wells at two sites at Union Carbide's Sistersville plant. Submitted herewith are these summaries. Reference is made to your correspondence to Mr. C. F. Schubert dated November 1, 1979.

Site 1

Site 1 is located at the base of a hill adjacent to the Ohio River flood plain. This site was used at the beginning of the construction of the Sistersville Plant as a disposal area for drums containing chemical wastes from other plants. This disposal area now appears in the form of three (3) small ponds each roughly 40 feet by 15 feet. An additional area to the south of these ponds has reportedly been used for drum disposal, however, no surface evidence was present.

The purpose of this work was to provide subsurface information around the periphery of the landfill and to install ground water monitoring wells from which samples could be taken over long term periods. Four (4) wells were installed at this site by Drilling Services, Inc., of Covington, Kentucky on December 11 and 12, 1979 under subcontract to us and under our observation. The borings were made using a combination of split spoon sampling and auger type drilling with two Shelby tubes obtained and two field permeability tests run.

The first boring was drilled down gradient about 100 feet from the site toward the river. This boring was drilled using an auger to advance the boring. A sample was obtained at a depth of 36 feet but for the primary purpose of demonstrating split spoon sampler. This boring revealed water at about 22 feet and a total depth of 42.5 feet to refusal.

Boring No. 2 was then drilled up gradient from the landfill. This boring revealed a very stiff, red and brown residual silty clay with rock fragments to a depth of 21 feet. This material appeared to be relatively impervious. At a depth of 21 feet, a very impervious layer of clay was encountered. Below this existed a gray clay silt to refusal at 36.5 feet. Water was encountered at 24 feet and the monitoring well was installed to a depth of 33 feet with the bottom 15 feet slotted. In general, split spoon samples were obtained in Holes 2, 3, and 4 at Site 1 at intervals varying from continuous to five (5) foot centers with the continuous samples being taken at the more critical locations. The wells were installed by slotting $1\frac{1}{2}$ inch pvc pipe using slots approximately 1/32nd inch wide approximately one inch on centers. Bank run sand was installed around the pipe to approximately two (2) feet above the slotted portions of the pipe. In general, the wellpoints were slotted for the entire layer where water was encountered and the seal placed just above this. Other special sampling procedures include initially scraping the sample to remove possible contamination from previous sample and storing the sample in decontaminated jars. At this location, a mixture of bentonite and portland cement was installed for the purpose of sealing the wellpoint and baring any contamination from above. Above this bentonite cement seal, a clay was backfilled to the top of ground. This clay was backfilled in a relatively loose manner and may settle somewhat. If this occurs, we recommend additional clay be mounted around the well.

In Boring No. 3 which was closest to the western most pond, small water veins were noted in the samples so this boring was not continued to refusal but was stopped at the layer of very impervious clay and an undisturbed Shelby tube was obtained. A Shelby tube is a relatively thin walled sample, metal tube, which is pushed into the ground by hydraulic pressure as opposed to the driving of the split spoon and this obtains a relatively undisturbed sample. The boring was terminated so that a sample of the most critical (probably) ground water could be obtained.

Boring No. 4 was drilled to refusal at about 28 feet and in this boring a highly pervious layer of sand and gravel was encountered between 22 and 27 feet.

Field permeability tests were made in Borings 3 and 4 with the following results:

Hole	Test Interval	Permeability
3	.5 - 16.5	3.2×10^{-7} cm/sec.
4	.5 - 21.5	6.8×10^{-7} cm/sec.

Conclusions - Site 1

Based on the results of the drilling, it is estimated that contamination at Site 1 will be minimal to nonexistent but future chemical analysis will confirm this. With respect to the drilling, less frequent sampling interval and using "proper" size jars with rubber or plastic seals would be appropriate.

The wells should provide representative samples and probably no additional work need be considered at this site.

Site 2

Site 2 is generally in the northern end of the plant and consists of several landfills which have built up over the years. Specific details of the composition of these landfills were not revealed to us. The sampling well locations were selected based on landfill locations. A total of eight (8) wells were installed at this site for the purpose of obtaining soil and eventual ground water samples for chemical analysis of possible contaminates. Two (2) of these borings were drilled above the landfill sites for the purpose of obtaining some background information on ground water. One of these borings (No. 3) did not encounter any water and, therefore, no monitoring well was installed. However, this boring was left open so that samples could be obtained if water enters the hole and it would be relatively easy to install the monitoring well at some future time. The other background well (No. 1) just east of an exposed ash refuse pile did hit water at about 14 feet. The remaining borings were made within the flood plain, generally either to a depth of about 10 feet below the ground water table or for the entire depth of the strata to bedrock.

Split spoon samples were obtained at intervals from 2.5 to five (5) feet in all of the flood plain borings. Of particular note was that a chemical odor was noted in most of the samples below the ground water level. It was also noted that this odor appeared stronger in the borings that were closest to the landfill. Some variation was made in the drilling program primarily based on field information obtained during the drilling.

Approximate location and numbers of the borings are indicated on the enclosed sketch for reference. It is our understanding that Union Carbide will locate all borings by survey. Enclosed are the driller's field logs of all of the borings to which some notes have been added based on our observations.

It must be noted that the method of sampling was changed during this drilling from the scraping of the samples to washing the sample spoon each time because scraping the sand samples appeared to be both ineffective and very inefficient in that considerable sample was wasted.

Conclusions - Site 2

In addition to the conclusions for Site 1, "washing" a wellpoint into the ground might prove to be effective for the sands and gravels at Site 2. If analysis indicates significant contamination, this method might be used for future well installations.

We hope that this report meets your needs. If you have any questions, please do not hesitate to call.

Very truly yours,

John W. James, P. E.
Geotechnical Engineer

JWJ: jlm

Enclosures

MPM0002539

EPA003454

DRILLING SERVICES INCORPORATED

516 Enterprise Drive
Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD
LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 1
PROJECT Subsurface Exploration, Union Carbide Plant, Site No. 1, Sistersville, JOB # C79099
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec
	SURFACE	0.8						
	TOPSOIL.							
	Brown moist stiff SILTY CLAY.	15.0	5 10 15					
	Brown moist medium stiff SILTY CLAY.	22.0	20					
	Gray moist medium stiff SILTY CLAY.	30.0	25 30					
	Brown and gray moist medium stiff sandy CLAY with gravel and brown rock.	37.5	35	I	6/10/11	1	DS	12"
	Gray moist medium stiff sandy CLAY, with gravel and broken rock.	39.0	40					
	Red moist stiff sandy SILT and broken rock.	42.5	45					
	Refusal and bottom of test boring at 42.5 feet.							

Datum –
Surf. Elev. – Ft.
Date Started 12/11/79

Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size O.D.2 In.

Hole Diameter 4"
Rock Core Dia. –
Boring Method CFA

Foreman W.M.
Engineer –
Date Completed 12/11/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 22.0 FT.
AT COMPLETION Dry FT.
AFTER HRS. FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002540

EPA003455

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Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD
LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 2
PROJECT Subsurface Exploration, Union Carbide Plant, Site No. 1, Sistersville, JOB # C79099
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Re
	SURFACE	0.0						
	Brown and red moist stiff SILTY CLAY.							
		5.0	5	I	20/21/24	1	DS	18
	Red and brown moist very stiff SILTY CLAY with broken rock.			I	13/16/22	2	DS	18
			10	I	11/15/20	3	DS	18
				I	13/19/21	4	DS	18
					Note:Scale Change			
			15	I	6/13/19	5	DS	18
		21.0	20	I	6/8/12	6	DS	18
	Gray moist stiff CLAY.							
			25	I	4/4/5	7	DS	18
			30	D	2/2/3	8	DS	18
	Bottom of test boring at 36.5 feet Note: Installed 36.0 feet of piezometer pipe including 3 feet above ground.	36.5	35	I	14/14/34	9	DS	18
			40					

Datum - Hammer Wt. 140 Lbs. Hole Diameter 4" Foreman W.M.
Surf. Elev. - Ft. Hammer Drop 30 In. Rock Core Dia. - Engineer -
Date Started 12/11/79 Pipe Size O.D.2 In. Boring Method CFA Date Completed 12/11/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 24.0 FT.
AT COMPLETION Note FT.
AFTER HRS FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002541

EPA003456

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Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 3
PROJECT Subsurface Exploration, Union Carbide Plant, Site No. 1, Sistersville, JOB # C79099
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec
	SURFACE	0.0						
	Brown moist very stiff SILTY CLAY with broken rock (permeability test from 0.5 to 16.5 feet, held test for 0.50 hours then registered 0.02 feet drop in 30 minutes).			I	6/8/10	1	DS	18'
			5	I	9/10/15	2	DS	18'
				I	8/9/10	3	DS	18'
			10	I	4/5/7	4	DS	18'
				I	6/8/11	5	DS	18"
				I	10/12/10	6	DS	18"
		16.0	15	I	7/8/11	7	DS	18"
	Gray moist medium stiff SILTY CLAY with broken rock.	19.0		U		1	PT	20"
	Bottom of test boring at 19.0 feet		20					
	Note: Installed 20.0 feet of piezometer pipe including 4.0 feet above ground.							

Datum - Hammer Wt. 140 Lbs. Hole Diameter 4" Foreman W.M.
Surf. Elev. - Ft. Hammer Drop 30 In. Rock Core Dia. - Engineer -
Date Started 12/12/79 Pipe Size O.D. 2 In. Boring Method CFA Date Completed 12/12/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 11.5 FT.
AT COMPLETION Note FT.
AFTER ____ HRS. ____ FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002542

EPA003457

DRILLING SERVICES INCORPORATED

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Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD

LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 4
PROJECT Subsurface Exploration, Union Carbide Plant, Site No. 1, Sistersville, /West Virginia JOB # C79099 DR-9633
LOCATION OF BORING As directed in the field

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Re
	SURFACE	0.0						
	Brown moist very stiff SILTY CLAY with broken rock.			I	8/10/11	1	DS	18
			5	I	6/13/14	2	DS	18
				I	6/6/13	3	DS	18
			10	I	6/8/12	4	DS	18
				I	12/14/15	5	DS	18
			15	I	12/13/16	6	DS	18
		21.0	20	I	4/6	7	DS	12
	Gray moist medium stiff SILTY CLAY.	22.0						
	Brown and gray wet medium dense fine to coarse SAND and GRAVEL.	27.5	25	D	4/7/8	8	DS	18
	Red moist soft SHALE.	28.0		I	50/6"	9	DS	6
	Bottom of test boring at 28.0 feet.		30					

Note: Installed 30.0 feet of piezometer pipe including 2.0 feet above ground. Permeability test held for 60 minutes with registered drop of 0.05 feet.

Datum - Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman W.M.
Surf. Elev. - Ft. Hammer Drop 30 In. Rock Core Dia. - Engineer -
Date Started 12/12/79 Pipe Size O.D.2 In. Boring Method HSA Date Completed 12/12/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

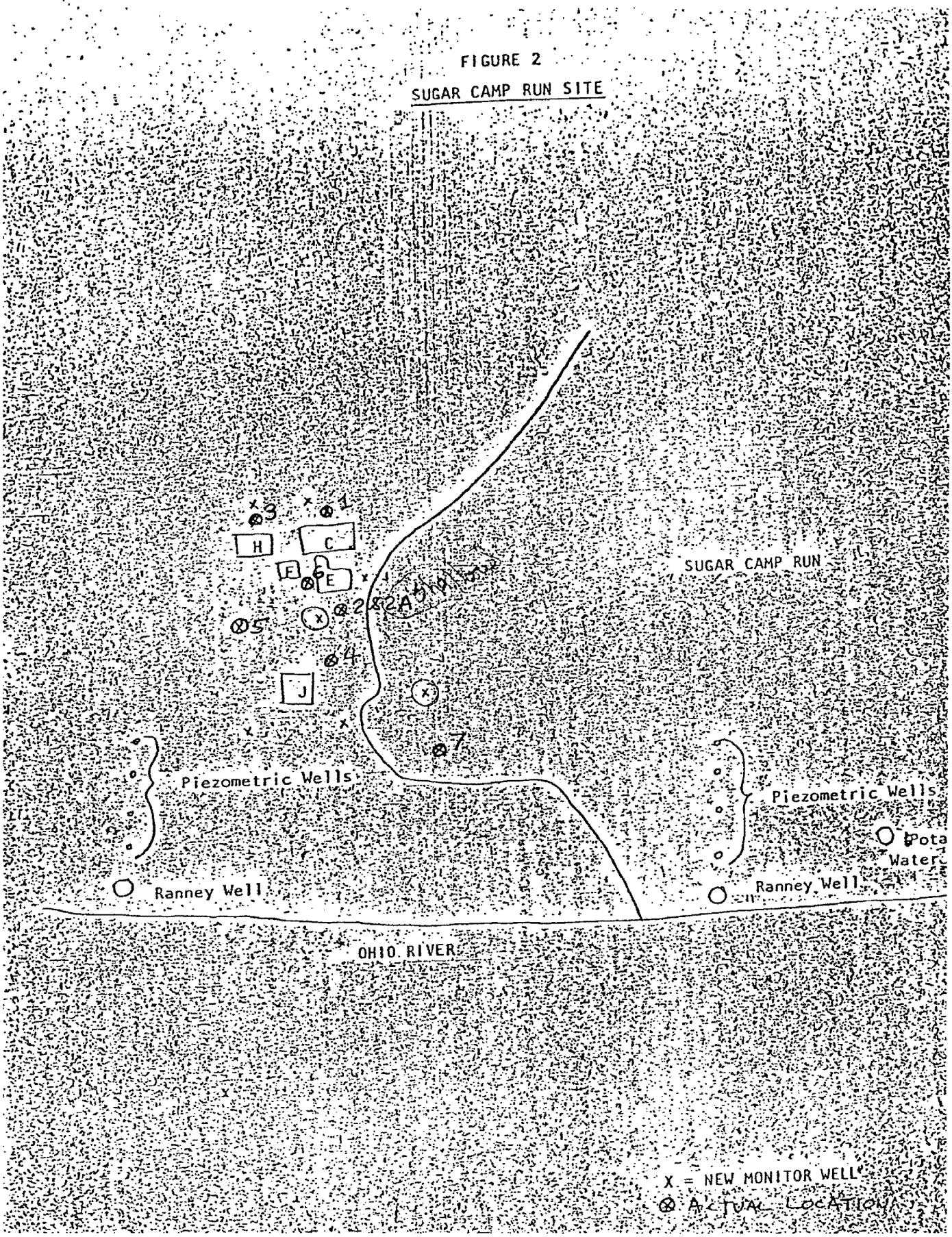
SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 22.0 FT.
AT COMPLETION Note FT.
AFTER HRS FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002543

EPA003458



MPM0002544

EPA003459

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Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD LOG OF ~~TEST~~ BORING

CLIENT Triad Engineering Consultants BORING # 1
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, /West Virginia JOB # C79100 DR-9633
LOCATION OF BORING As directed in the field

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec
	SURFACE	0.0						
	Red moist very stiff SILTY CLAY.	10.0	5 10					
	Brown moist medium stiff SILTY CLAY.	14.0	15					
	Gray and red moist medium stiff SILTY CLAY.	18.0						
	Red and gray moist SHALE.	22.5	20					
	Brown SANDSTONE.	24.0	25					
	Bottom of test boring at 24.0 feet.							
	NOTE: Installed 28.0 feet of piezometer pipe including 3.5 feet above ground.							

Datum –
Surf. Elev. – Ft.
Date Started 12/79/79

Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size O.D.2 In.

Hole Diameter 4"
Rock Core Dia. –
Boring Method CFA

Foreman W.M.
Engineer –
Date Completed 12/17/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE

GROUND WATER DEPTH
FIRST NOTED 14.0 FT.
AT COMPLETION Note FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002545

EPA003460

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Test Borings Rock Coring
Pressure Testing

Phone:
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FIELD
LOG OF TEST BORING

CLIENT Triad Engineering Consultants — BORING # 2 (1/2)
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, — JOB # C79100
LOCATION OF BORING As directed in the field /West Virginia — DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Re
	SURFACE	0.0						
	Brown moist medium stiff clayey SAND and GRAVEL.	7.5	5	D	6/3/4	1	DS	14
	Brown moist medium dense fine SAND.	12.5	10	D	3/4/7	2	DS	12'
				D	3/4/6	3	DS	16'
	Brown moist medium dense fine to coarse SAND.		15	D	6/7/10	4	DS	16'
				D	3/4/7	5	DS	15'
				D	4/5/6	6	DS	17'
			20		Note: Scale Change			
		24.0		D	3/3/7	7	DS	18'
	Brown and gray wet medium dense fine to coarse SAND and GRAVEL with chemical odor from 30.0 to 54.2 feet.		25	D	10/12/13	8	DS	18'
			30	-	Wash	9	-	-
			35	D	10/3/4	10	DS	18"

Datum —
Surf. Elev. — Ft.
Date Started 12/17/79

Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size O.D.2 In.

Hole Diameter 8"
Rock Core Dia. —
Boring Method HSA

Foreman W.M.
Engineer —
Date Completed 12/17/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 19.0 FT.
AT COMPLETION Note FT.
AFTER ____ HRS. ____ FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002546

EPA003461

DRILLING SERVICES INCORPORATED

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Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD
LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 2(2/2)
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, JOB # C79100
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec
			35					
	Brown and gray wet medium dense fine to coarse SAND and GRAVEL with chemical odor from 30.0 to 54.2 feet.		40	D	10/3/4	10	DS	18
				D	8/8/12	11	DS	18'
			45	D	8/7/8	12	DS	1[illegible]
			50	D	40/76	13	DS	1[illegible]
		54.2	55	D	70/2"	14	DS	0'
	Bottom of test boring at 54.2 feet.							
	NOTE: Installed 52.0 feet of piezometer pipe including 2.0 feet above ground.							

Datum -- Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman W.M.
Surf. Elev. -- Ft. Hammer Drop 30 In. Rock Core Dia. - Engineer -
Date Started 12/17/79 Pipe Size O.D.2 In. Boring Method HSA Date Completed 12/17/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 19.0 FT.
AT COMPLETION Note FT.
AFTER ____ HRS. ____ FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002547

EPA003462

DRILLING SERVICES INCORPORATED

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Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD
LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 2A
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, JOB # C79100
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Rec
	SURFACE	0.0						
	Brown moist medium dense clayey SAND with fine gravel.		5	D	6/3/4	1	DS	16"
		10.0	10	D	4/6/7	2	DS	18"
	Brown moist medium dense fine SAND.		15	D	5/7/10	3	DS	18"
				D	6/8/8	4	DS	18"
			20	D	5/7/8	5	DS	18"
			25	D	6/5/6	6	DS	18"
		31.5	30	D	6/7/8	7	DS	18"
	Bottom of test boring at 31.5 feet.		35					
	NOTE: Installed 30.0 feet of piezometer pipe including 2.5 feet above ground.							

Datum - Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman W.M.
Surf. Elev. - Ft. Hammer Drop 30 In. Rock Core Dia. - Engineer -
Date Started 12/18/79 Pipe Size O.D.2 In. Boring Method HSA Date Completed 12/18/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 18.0 FT.
AT COMPLETION Note FT.
AFTER HRS FT

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002548

EPA003463

DRILLING SERVICES INCORPORATED

516 Enterprise Drive
Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD

LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 3
PROJECT Subsurface Exploration, Union Carbide Plant Site No.2, Sistersville, JOB # C79100
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Re
	SURFACE							
	Brown and red most stiff SILTY CLAY.	1.0						
	Red moist very soft SHALE, some sandstone layers.	10.0	5 10					
	Gray moist hard SHALE with sandstone layers.	20.0	15 20					
	Bottom of test boring at 20.0 feet.							

Datum - Hammer Wt. 140 Lbs. Hole Diameter 4" Foreman W.M.
Surf. Elev. - Ft. Hammer Drop 30 In. Rock Core Dia. - Engineer -
Date Started 12/18/79 Pipe Size O.D.2 In. Boring Method CFA Date Completed 12/18/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED None FT.
AT COMPLETION Dry FT.
AFTER HRS FT

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002549

EPA003464

DRILLING SERVICES INCORPORATED

516 Enterprise Drive
Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 4
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, JOB # C79100
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Re
	SURFACE	0.0						
	Brown moist medium dense clayey fine SAND with fine gravel.	7.5	5	D	3/4/5	1	DS	16
				D	4/6/7	2	DS	18
			10	D	4/5/7	3	DS	16
			15	D	4/6/5	4	DS	18
				D	10/12/12	5	DS	18'
			20					
			25	D	6/6/8	6	DS	18'
			30	D	5/7/8	7	DS	18'
			35	D	6/7/9	8	DS	18'
	Brown moist medium dense fine to coarse SAND.							
			40	D	9/9/11	9	DS	18'
	Brown moist medium dense fine to coarse SAND and GRAVEL.	45.0	45	D	6/11/10	10	DS	10'
	Bottom of test boring at 50.2 feet.	50.2	50	D	55/2"	11	DS	2'
	NOTE: Installed 50.0 feet of piezometer pipe including 2.0 feet above ground.		55					

Datum –
Surf. Elev. – Ft.
Date Started 12/18/79

Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size O.D.2 In.

Hole Diameter 8"
Rock Core Dia. –
Boring Method HSA

Foreman W.M.
Engineer –
Date Completed 12/19/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 15.5 FT.
AT COMPLETION Note FT.
AFTER HRS FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002550

EPA003465

DRILLING SERVICES INCORPORATED

516 Enterprise Drive
Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 5
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, JOB # C79100
LOCATION OF BORING As directed in the field /West Virginia DR-9633

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	R
	SURFACE	0.0						
	Brown moist medium dense fine to coarse SAND and fine GRAVEL.	4.0						
	Brown moist medium dense fine SAND.		5	D	6/11/13	1	DS	12
			10	D	5/8/9	2	DS	18
			15	D	6/8/9	3	DS	18
			20	D	3/4/5	4	DS	18
				D	5/6/7	5	DS	18
			25	D	3/8/9	6	DS	18
		31.5	30	D	4/6/8	7	DS	18
	Bottom of test boring at 31.5 feet.		35					
	NOTE: Installed 32.0 feet of piezometer pipe including 2.0 feet above ground.							

Datum – Hammer Wt. 140 Lbs. Hole Diameter 8" Foreman W.M.
Surf. Elev. – Ft. Hammer Drop 30 In. Rock Core Dia. – Engineer –
Date Started 12/19/79 Pipe Size O.D.2 In. Boring Method HSA Date Completed 12/19/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 20.0 FT.
AT COMPLETION Note FT.
AFTER HRS FT

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002551

EPA003466

DRILLING SERVICES INCORPORATED

516 Enterprise Drive
Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD

LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 6
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, JOB # C79100
LOCATION OF BORING As directed in the field /West Virginia DR-963

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	R
	SURFACE	0.0						
	Brown and gray moist medium stiff FILL, sandy clay.		5					
			10					
		16.0	15					
	Gray and brown moist medium dense fine SAND.		20	D	2/2/3	1	DS	18
			25	D	7/8/7	2	DS	18
			30	D	6/7/7	3	DS	18
			35	D	3/5/6	4	DS	18
		41.5	40	D	5/5/6	5	DS	18
	Bottom of test boring at 41.5 feet. NOTE: Installed 44.0 feet of piezometer pipe, including 2.5 feet above ground.		45					

Datum -
Surf. Elev. - Ft.
Date Started 12/19/79

Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size O.D.2 In.

Hole Diameter 8"
Rock Core Dia. -
Boring Method HSA

Foreman W.M.
Engineer -
Date Completed 12/19/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT
U – UNDISTURBED

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE
CA – CONTINUOUS FLIGHT AUGER

GROUND WATER DEPTH
FIRST NOTED 25.0 FT.
AT COMPLETION Note FT.
AFTER HRS FT

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002552

EPA003467

DRILLING SERVICES INCORPORATED

516 Enterprise Drive
Covington, Kentucky 41017

Exploratory Drilling
Test Borings Rock Coring
Pressure Testing

Phone:
606-341-4958

FIELD
LOG OF TEST BORING

CLIENT Triad Engineering Consultants BORING # 7
PROJECT Subsurface Exploration, Union Carbide Plant Site No. 2, Sistersville, /West Virginia JOB # C79100 DR-9633
LOCATION OF BORING As directed in the field

ELEV.	SOIL DESCRIPTION COLOR, MOISTURE, DENSITY, PLASTICITY, SIZE, PROPORTIONS	STRA. DEPTH	DEPTH SCALE	SAMPLE Cond	Blows/6"	No.	Type	Re
	SURFACE	0.0						
	Black moist medium stiff FILL, sandy clay with gravel.	16.0	5 10 15					
	Brown moist medium stiff sandy CLAY with fine gravel.	22.0	20					
	Brown and gray wet medium dense fine SAND.	36.5	25 30 35	D	9/9/10	1	DS	18
				D	3/6/7	2	DS	18
				D	4/4/6	3	DS	18
	Bottom of test boring at 36.5 feet.		40					
	NOTE: Installed 38.0 feet of piezometer pipe, including 2.5 feet above ground.							

Datum –
Surf. Elev. – Ft.
Date Started 12/19/79

Hammer Wt. 140 Lbs.
Hammer Drop 30 In.
Pipe Size O.D. 2 In.

Hole Diameter 8"
Rock Core Dia. –
Boring Method HSA

Foreman W.M.
Engineer –
Date Completed 12/19/79

SAMPLE CONDITIONS
D – DISINTEGRATED
I – INTACT

SAMPLER TYPE
DS – DRIVEN SPLIT SPOON
PT – PRESSED SHELBY TUBE

GROUND WATER DEPTH
FIRST NOTED 22.0 FT.
AT COMPLETION Note FT.

BORING METHOD
HSA – Hollow Stem Augers
CFA – Continous Flight Augers
DC – Driving Casing

MPM0002553

EPA003468

NO C

	CO-ORDINATES		TOP CASING ELEV.	GROUND ELEV.
1	S-1838	E-1946	——	653.4
2	S-1770	E-2254	694.63	691.8
3	S-1694	E-2166	683.25	678.6
4	S-1934	E-2126	674.88	673.4

MPM0002554

EPA003469